electrode by a constant distance and having its size at the central region of each side smaller than its size at a corner region thereof, thereby reducing stress damage to the piezoelectric transformer.

Figure 1 of Danov illustrates three different inner/outer electrode arrangements. While the center arrangement illustrates a square inner electrode (which is a special rhombic shape), the arrangement of Danov does not teach or suggest an output electrode separated from the input electrode by a predetermined constant distance and a peripheral region on the first face so that its size at the central region of each side is smaller than its size at the corner region as recited in new claim 12. Accordingly, it is submitted that claim 12 defines over Danov.

None of the three arrangements of Figure 1 of Danov teach or suggest an input electrode having a substantially cross shape as recited in new claim 11. Accordingly, it is submitted that claim 11 defines over Danov.

Furthermore, while the arrangement on the right side of Figure 1 of Danov illustrates a diamond shaped inner electrode, the arrangement of Danov does not teach or suggest an output electrode separated from the input electrode by a predetermined constant distance and a peripheral region on the first face so that its size at the central region of each side is smaller than its size at the corner region as recited in new claim 10. Rather, the aperture in the outer electrode of the arrangement of Danov is hexagonal shaped and therefore the outer electrode is not separated from the input electrode by a predetermined constant distance. Accordingly, it is submitted that claim 10 defines over Danov.

As to the remaining claims, it is submitted that by their dependency upon new claims 10-12, these claims also define over Danov.

The technical problem to be solved by the present invention is to eliminate the heat caused by stress and prevent the damage to the piezoelectric block of the transformer. The inventors have found that the stress is chiefly generated near the central region of each side of the piezoelectric block. Thus, the present invention is based on the recognition of a new problem and theory. However, the object of Danov is just to design a compact, reliable and economic converter using a piezoceramic transformer which can handle household electricity (110/220V AC with 50/60Hz directly and a larger power up to 40W). Danov did not consider

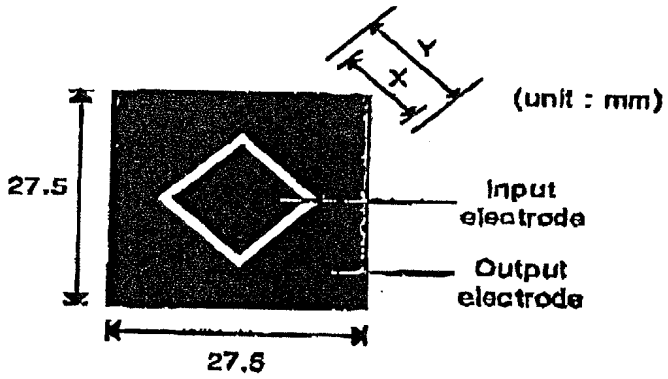
or recognize the new problem and theory described in the present invention.

In order to solve the problem, the present invention provides a new piezoelectric transformer comprising a diamond or cross-shaped or rhombic input electrode and an output electrode separated from the input electrode by a constant distance and having its size at the central region of each side smaller than its size at the corner region, thereby reducing heat at the maximum stress generating area. However, Danov did not disclose the construction of the structure of the present invention. With the right side arrangement of Fig. 1 of Danov, when driving a high power-fluorescent lamp, arcing may occur at a gap between the output electrode and a corner of a diamond shape input electrode, since the gap therebetween is smaller than anywhere else.

The recited optimized input/output electrode length ratio of claim 10 is not a simple change in size, but causes superior results that cannot be expected from Danov. The following experiment is provided as evidence for this.

(Experiment)

Contour-vibration mode piezoelectric transformers with diamond-type input/output electrodes were fabricated. A schematic diagram of one transformer is shown as below:

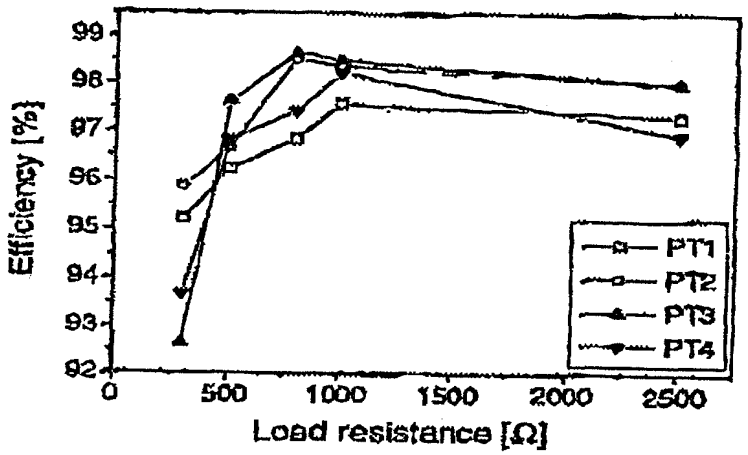


In this experiment, the dimensional specifications of four piezoelectric transformers were fabricated as listed in Table 1.

(Table1)

	PT1	PT2	PT3	PT4
X(mm)	9	11	13	15
Y(mm)	11	13	15	17
Length ratio	3.05	2.5	2.1	1.8

Impedance properties of the transformers were measured as a function of frequency using an impedance analyzer (HP4194A) with no load, and the electrical c
haracteristics under the variation in load resistance were investigated utilizing an oscilloscope (tektronix TDS460A). The efficiency of the transformers as a function of load resistance is shown graphically below:



Efficiencies higher than 90% were obtained for all the transformers. The maximum efficiencies in the PT2 and PT3 and PT4 were proved to be 98.5% and 98.6% at load resistance of 800Ω and 98.2% at load resistance 1kΩ. But if the length ratio is above 3.14, the output iimpedance may be too high to match the lamp impedance. If it is below 1.5, the output power is too low to light the lamp.

Therefore, when the length ratio of a side of the input electrode to a side of the output electrode is within the range of 1:15-1:3.14, a high efficiency transformer can be obtained.

In view of the above, it is submitted that claims 4-6 and 10-18 define over Danov and should therefore now be in a condition suitable for allowance.

Additional references were cited by the Examiner but not utilized in the rejection of the claims and accordingly, no further comment on these references is necessary.

No other issues remaining, reconsideration and favorable action upon all of the claims now present in the application is respectfully requested.

Please charge any fees or credit any overpayment to Deposit Account No. 07-1337.

Respectfully submitted,

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